

Tiffany, Bruce

From: Tiffany, Bruce
Sent: Tuesday, June 26, 2007 10:49 AM
To: Cargill, Dan (ECY)
Cc: Strong, Despina; Stern, Jeff
Subject: RE: Cargill blows it - needs your help
Attachments: LDW_DraftSourceControlStatus_061207(BT_edits).doc; KC-LDW-PDS-Phase2-R1-R15_Data_For_RI.pdf; LDW_PDS_R1-R15_Narrative_for_RI.doc

Hi Dan;

Please see my edits to the LDW SC Status Report (attached).

I have also included some data and a narrative for the 12 rounds of passive air deposition sampling conducted from October 2005 to December 2006. I originally prepared this information last month for the upcoming RI report. You can cite this as a personal communication with me. The final air deposition report is expected in fall 2007.

Thanks,

Bruce

Bruce Tiffany, P.E.
King County - Industrial Waste Program
130 Nickerson St., Suite 200
Seattle, WA 98109-1658
T: 206-263-3011

From: Cargill, Dan (ECY) [mailto:DACA461@ECY.WA.GOV]
Sent: Wednesday, June 20, 2007 12:03 PM
To: Tiffany, Bruce; Strong, Despina; Doug Hotchkiss
Subject: Cargill blows it - needs your help

I've lost it.

I have a ridiculous request. My fault. I need your help if you can. I need input by Tuesday, June 26.

In the crush of the Slip 4 meeting and a bunch of other stuff, I don't have a record of sending this out and am pretty sure I didn't.

I realize my error is not your emergency. If you can comment by Tuesday, great, if not, I'll try to get publication moved back a couple of weeks. If managers won't buy that, it will go out with a disclaimer and we will correct errors in the next one. Focus on issues or topics relevant to King County and the Port.

Ecology has contracted SAIC to summarize source control activities for the Lower Duwamish.

The report is on our ftp site at <ftp://www.ecy.wa.gov/>

The folder is labeled **LDW SC status report - draft**

6/26/2007

We are trying to publish this by the first half of July. We will publish updates with any needed corrections about every six months thereafter

The report is a compilation of published and draft SCAPs, the inspection Blue Book reports and the summaries of existing information and data gaps reports that Sarah has been pumping out.

Chapter 1 is a rehash of things that have been published in the Source Control strategy and Duwamish/Diagonal Way SCAP regarding source control, the work group, roles and responsibilities.

Chapter 2 is lifted largely from the SPU/King County Blue source control reports.

Chapter 3 is Ecology's take on developing action plans and deals with a basic assumption: contaminated site cleanup is the critical path to allowing sediment cleanup, since it could take the longest time. It discusses our staffing issues.

Chapter 4 is being reworked. Some senior folks at EPA think that most businesses need an NPDES permit and that the permit addresses all of the potential source control issues and contaminants. They are also blissfully unaware of what the Muni permits do and don't do. Any thoughts you have on these matters are welcome.

Chapters 5 and 6 deal, SCAP by SCAP with what is known, what is being done and what is planned. The "upcoming activities" was a late addition to the draft. Anything you can add would be helpful.

Chapter 7 is a placeholder.

I need you to look over the draft and correct major flaws and add any Upcoming activities you may have planned for an area. No detailed dissertations. A sentence or two will do.

Kris Flint and Beth are reviewing it.

McDonald's manager trainee program is looking good at the moment.

Dan
425-649-7023

6/26/2007

LDW REMEDIAL INVESTIGATION REPORT: LDW PASSIVE AIR DEPOSITION SAMPLING – OCTOBER 2005 TO DECEMBER 2006

1. INTRODUCTION

This narrative description presents information about air deposition sampling conducted as part of source control efforts for the Lower Duwamish Waterway superfund cleanup. The purpose of the sampling was to evaluate the air deposition pathway for selected chemicals of concern that pose a risk to contaminate Lower Duwamish Waterway sediments.

Sampling was conducted by use of passive deposition samplers designed to collect rainfall (i.e., wet deposition) although the samplers also collect dry particulate (i.e., dry deposition).

The original (Phase 1) sampling in the Lower Duwamish Waterway was conducted between January 2005 and May 2005. This testing provided useful information about the approximate level of deposition rates in the Lower Duwamish Waterway basin; however, an outcome of this testing was that a revised sampler design was necessary.

After sampler redesign, Phase 2 of sampling occurred between October 2005 and December 2006. During this time period, King County Industrial Waste Program staff conducted 12 rounds of air deposition sampling at five stations in the Lower Duwamish Waterway drainage basin.

Phase 2 sampling ended in April 2007 and the final monitoring report is planned for release in Fall 2007.

2. PASSIVE AIR DEPOSITION SAMPLING

Passive air deposition sampling occurred from October 25, 2005 through December 5, 2006. This sampling interval was divided into 15 rounds. Of this time period, samples were not collected for three rounds: Round 4 (December 21, 2005 to January 11, 2006), Round 8 (February 27, 2006 to April 20, 2006), and Round 14 (November 1, 2006 to November 21, 2006). The samplers for Rounds 4 and 14 were placed in the field but excess rainfall resulted in overflow of the samplers; therefore, representative samples could not be collected for these rounds and the samples were not submitted for laboratory analysis. As for Round 8, this represents the time period when both the Beacon Hill and Duwamish stations were out of service and in the process of being relocated. Round 9 commenced when the Duwamish station was returned to service in the new location.

2.1 Sampler Design and Preparation

Each passive deposition sampler consisted of the following components:

- 1.05-ft diameter polypropylene funnel w/stem removed. (w/holes drilled in the side rim for insertion of natural twine.)

- 0.5-ft diameter stainless steel funnel
- 2.5-gallon glass carboy
- Natural twine
- Aluminum foil

Please see the attached **Photograph** for an example of a passive deposition sampler being placed in the field.

The sampler components were cleaned at the King County Environmental Laboratory (KCEL) prior to assembly. After assembly, an aqueous equipment rinsate sample was collected for each round by pouring purified laboratory water through a sampling apparatus, swirling the contents around the inside of the carboy, removing the funnels from the apparatus, and decanting the liquid into an amber glass bottle for subsequent laboratory analysis. The apparatus was then reassembled with the glass carboy wrapped in aluminum foil to minimize the photodegradation of chemicals of concern.

Before the samplers were placed in the field, a KCEL chemist added a deuterated monitoring compound spike into each sampler. The spike consisted of a 500 nanogram (ng) mixture of the following deuterated PAH/phthalate compounds:

- Acenaphthylene-d8
- Anthracene-d10
- Benzo(a)pyrene-d12
- Dimethylphthalate-d6
- Fluorene-d10
- Pyrene-d10

For Rounds 6, 7, 9, 12, 13 and 15 PCB analysis was performed and field spikes added to each sampler. For Round 6, a 100 ng spike of 2,4,5,6-Tetrachloro-m-xylene was added to each sampler. For Rounds 7, 9, 12, 13 and 15 a 100 ng spike of Decachlorobiphenyl was added to each sampler.

2.2 Sampling Stations

The Phase 2 passive deposition sampling occurred over 12 rounds from October 2005 through December 2006 at five sampling stations in the Lower Duwamish drainage area. These stations (with owner/operator) were as follows:

- Beacon Hill (Washington State Department of Ecology) – Symbol: BW (and BWR)
- Duwamish (Puget Sound Clean Air Agency) – Symbol: CE (and CER)
- Georgetown (Washington State Department of Ecology) – Symbol: DZ
- King County International Airport (King County) – Symbol: KCIA
- South Park Community Center (Seattle Parks Department) – Symbol: SPCC

See the attached **Figure 1** for locations of sampling stations.

See the attached **Table 1** for information on sample collection.

2.3 Sampler Installation and Retrieval

The locations for samplers within each station were chosen to be free of overhead interference.

At the time of sample collection, observations of sampler condition were recorded along with the date and time of sampler removal. The funnels of each sampler were removed and covered in aluminum foil. The carboy of the passive deposition sampler was capped with a metal lid.

These samples were then placed in the utility van for transport to KCEL. All samplers removed from the stations were delivered to KCEL on the same day they were collected.

3. CHEMICAL ANALYSIS

3.1 Sample Extraction for Phthalate/PAH Analysis

The aqueous samples were extracted by use of JT Baker C18 solid phase extraction cartridges and analyzed for PAH and phthalates according to EPA Method 8270B. Wipe tests were conducted on both the polypropylene funnel and the stainless steel funnel of each passive deposition sampler. The wipe samples were extracted and analyzed for PAH and phthalates according to EPA Method 8270B.

3.2 Solvent Exchange of Phthalate/PAH Extract for PCB Analysis

PCB analysis was conducted for Rounds 6, 7, 9, 12, 13 and 15. The original methylene chloride extracts for the phthalate/PAH analyses were split and a solvent exchange into hexane conducted in the fume hoods at KCEL. These hexane extracts were then analyzed for PCBs according to EPA Method 8082.

3.3 Phthalate/PAH and PCB Analyses

The following compounds were analyzed:

PAH

2-Methylnaphthalene (A)
Acenaphthene (A)
Acenaphthylene (A)
Anthracene (A)
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene

Phthalates

Butyl Benzyl Phthalate
Bis(2-Ethylhexyl)Phthalate
Di-*n*-Butyl Phthalate
Di-*n*-Octyl Phthalate
Diethyl Phthalate
Dimethyl Phthalate

Benzo(<i>g,h,i</i>)perylene	<u>PCB Mixtures</u>
Benzo(<i>k</i>)fluoranthene	Aroclor 1016
Chrysene	Aroclor 1221
Dibenzo(<i>a,h</i>)anthracene	Aroclor 1232
Fluoranthene (A)	Aroclor 1242
Fluorene (A)	Aroclor 1248
Indeno(1,2,3- <i>cd</i>)Pyrene	Aroclor 1254
Naphthalene (A)	Aroclor 1260
Phenanthrene (A)	
Pyrene	

Notes: (A) – Analyte not included in discussion of results. Previous testing indicated that recoveries for low molecular weight PAH are unacceptably low for inclusion in this study.

4. CHEMICAL RESULTS

4.1 Evaluation of Blank-Related Phthalate Contamination

Because phthalates are common field and laboratory contaminants, several equipment blank samples were collected and analyzed. For the aqueous samples, the same volume of liquid (2-liters) was used for each equipment blank and the associated method blank. For the funnel wipe samples, the same wipe material and solvent was used for each equipment blank as well as for the associated method blank.

Based on a review of the equipment blank and method blank data, a correction factor of two-times (2x) the associated method blank was determined to be an acceptable approach to accounting for blank-related phthalate contamination.

4.2 Phthalate/PAH/PCB Results Presented According to Sampling Station

The phthalate, PAH, and PCB air deposition flux values, sorted according to sampling station, are presented in the attached **Table 2**. The range of selected sample values, per station, is as follows:

Butyl Benzyl Phthalate (Detects Only)

- **BW (and BWR):** 0.193 to 0.980 $\mu\text{g}/\text{m}^2/\text{day}$
- **CE (and CER):** 0.287 to 1.069 $\mu\text{g}/\text{m}^2/\text{day}$
- **DZ:** 0.215 to 0.883 $\mu\text{g}/\text{m}^2/\text{day}$
- **KCIA:** 0.216 to 2.913 $\mu\text{g}/\text{m}^2/\text{day}$
- **SPCC:** 0.261 to 7.007 $\mu\text{g}/\text{m}^2/\text{day}$

Bis(2-Ethylhexyl) Phthalate (Detects Only)

- **BW (and BWR):** 0.955 to 2.030 $\mu\text{g}/\text{m}^2/\text{day}$
- **CE (and CER):** 1.439 to 12.240 $\mu\text{g}/\text{m}^2/\text{day}$
- **DZ:** 0.402 to 3.654 $\mu\text{g}/\text{m}^2/\text{day}$
- **KCIA:** 0.268 to 2.275 $\mu\text{g}/\text{m}^2/\text{day}$
- **SPCC:** 0.261 to 6.370 $\mu\text{g}/\text{m}^2/\text{day}$

Aroclor 1254

- **BW (and BWR):** Detects: None – Detection Limit Range: <0.019 to <0.062 $\mu\text{g}/\text{m}^2/\text{day}$
- **CE (and CER):** Detects: None – Detection Limit Range: <0.011 to <0.063 $\mu\text{g}/\text{m}^2/\text{day}$
- **DZ:** Detects: 0.030 $\mu\text{g}/\text{m}^2/\text{day}$ (R9), 0.030 $\mu\text{g}/\text{m}^2/\text{day}$ (R12) and 0.021 $\mu\text{g}/\text{m}^2/\text{day}$ (R13) – Detection Limit Range: <0.011 to <0.062 $\mu\text{g}/\text{m}^2/\text{day}$
- **KCIA:** Detects: 0.045 $\mu\text{g}/\text{m}^2/\text{day}$ (R9) and 0.024 $\mu\text{g}/\text{m}^2/\text{day}$ (R12) – Detection Limit Range: <0.011 to <0.062 $\mu\text{g}/\text{m}^2/\text{day}$
- **SPCC:** Detects: 0.011 $\mu\text{g}/\text{m}^2/\text{day}$ (R12) – Detection Limit Range: <0.011 to <0.062 $\mu\text{g}/\text{m}^2/\text{day}$

Aroclor 1260

- **BW (and BWR):** ND Detects: None – Detection Limit Range: <0.019 to <0.062 $\mu\text{g}/\text{m}^2/\text{day}$
- **CE (and CER):** Detects: 0.014 $\mu\text{g}/\text{m}^2/\text{day}$ (R12) and 0.019 $\mu\text{g}/\text{m}^2/\text{day}$ (R13) – Detection Limit Range: <0.011 to <0.063 $\mu\text{g}/\text{m}^2/\text{day}$
- **DZ:** Detects: 0.034 $\mu\text{g}/\text{m}^2/\text{day}$ (R9), 0.024 $\mu\text{g}/\text{m}^2/\text{day}$ (R12) and 0.019 $\mu\text{g}/\text{m}^2/\text{day}$ (R13) – Detection Limit Range: <0.011 to <0.062 $\mu\text{g}/\text{m}^2/\text{day}$
- **KCIA:** Detects: 0.019 $\mu\text{g}/\text{m}^2/\text{day}$ (R12) – Detection Limit Range: <0.011 to <0.062 $\mu\text{g}/\text{m}^2/\text{day}$
- **SPCC:** Detects: None – Detection Limit Range: <0.011 to <0.062 $\mu\text{g}/\text{m}^2/\text{day}$



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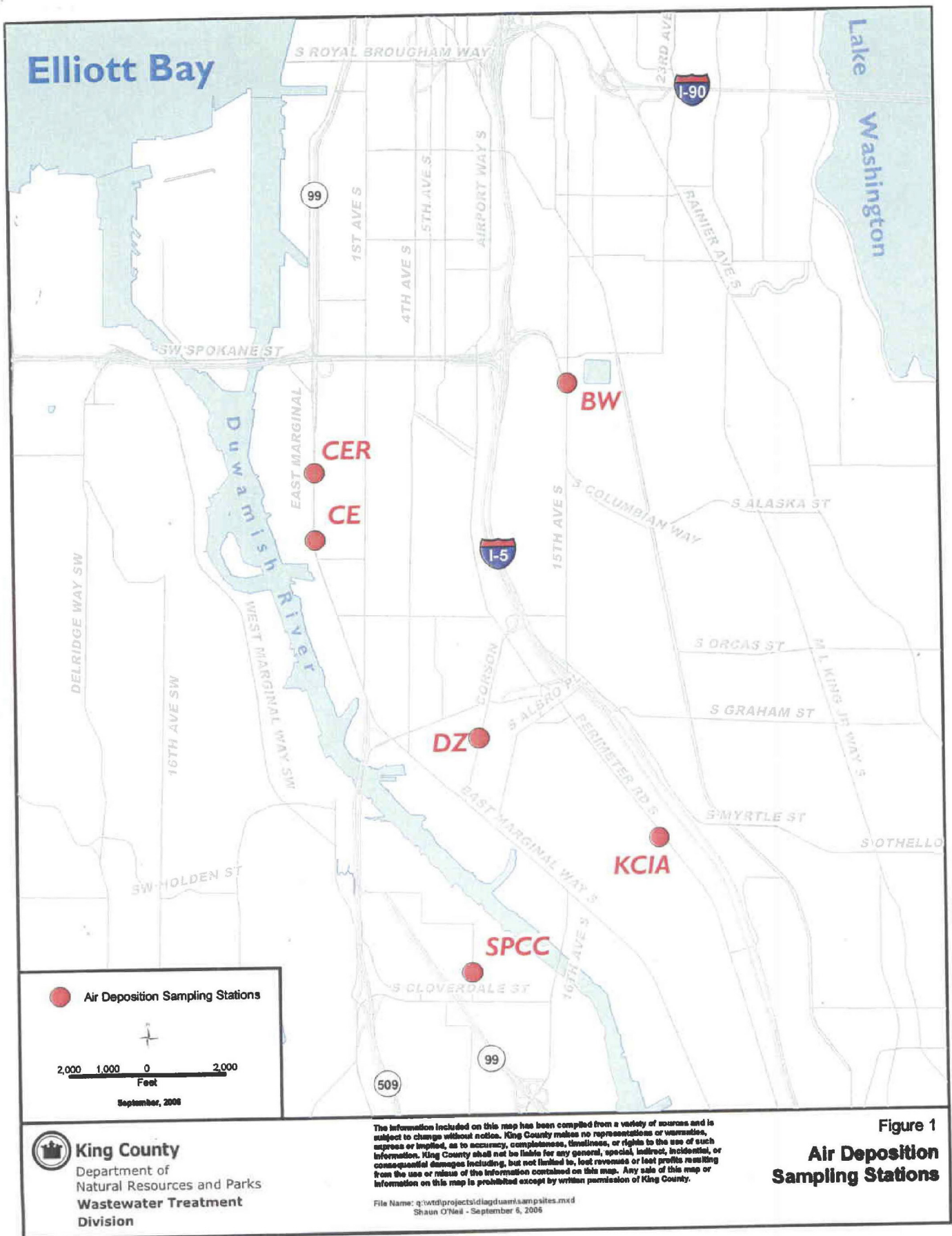


Table 1 - Sample Matrix
Lower Duwamish - Passive Deposition Sampling - Phase 2

Station	Beacon Hill	Beacon Hill (Relocated)	Duwamish	Duwamish (Relocated)	Georgetown	King County International Airport - Terminal	South Park Community Center
Station ID	BW	BWR	CE	CER	DZ	KCIA	SPCC
Location	15th S. & Charlestown		4752 E. Marginal Wy. S.	4401 E. Marginal Wy. S.	6431 Corson Ave. S.	7277 Perimeter Rd.	8319 8th. Ave. S.
Latitude	N47°34'10.8"	N47°34'07.0"	N47°33'30.7"	N47°33'47.8"	N47°32'41.2"	N47°32'12.9"	N47°31'42.4"
Longitude	W122°18'44.4"	W122°18'32.2"	W122°20'19.4"	W122°20'26.2"	W122°19'24.9"	W122°18'14.1"	W122°19'25.3"
Round 1							
Start	10/25/2005	-	10/25/2005	-	10/25/2005	10/25/2005	10/25/2005
End	11/8/2005	-	11/8/2005	-	11/8/2005	11/8/2005	11/8/2005
Days	14	-	14	-	14	14	14
Total Rainfall, Inches	3.98 (A)	-	3.98 (A)	-	3.98 (A)	3.98 (A)	3.98 (A)
Reference Volume, L	8.13 (B)	-	8.13 (B)	-	8.13 (B)	8.13 (B)	8.13 (B)
Round 2							
Start	11/8/2005	-	11/8/2005	-	11/8/2005	11/8/2005	11/8/2005
End	11/30/2005	-	11/30/2005	-	11/30/2005	11/30/2005	11/30/2005
Days	22	-	22	-	22	22	22
Total Rainfall, Inches	2.94 (A)	-	2.94 (A)	-	2.94 (A)	2.94 (A)	2.94 (A)
Reference Volume, L	6.01 (B)	-	6.01 (B)	-	6.01 (B)	6.01 (B)	6.01 (B)
Round 3							
Start	11/30/2005	-	11/30/2005	-	11/30/2005	11/30/2005	11/30/2005
End	12/21/2005	-	12/21/2005	-	12/21/2005	12/21/2005	12/21/2005
Days	21	-	21	-	21	21	21
Total Rainfall, Inches	1.40 (A)	-	1.40 (A)	-	1.40 (A)	1.40 (A)	1.40 (A)
Reference Volume, L	2.86 (B)	-	2.86 (B)	-	2.86 (B)	2.86 (B)	2.86 (B)
Round 4 (No Samples)							
Start	12/21/2005	-	12/21/2005	-	12/21/2005	12/21/2005	12/21/2005
End	1/11/2006	-	1/11/2006	-	1/11/2006	1/11/2006	1/11/2006
Days	21	-	21	-	21	21	21
Total Rainfall, Inches	11.25 (A)	-	11.25 (A)	-	11.25 (A)	11.25 (A)	11.25 (A)
Reference Volume, L	22.99 (B)	-	22.99 (B)	-	22.99 (B)	22.99 (B)	22.99 (B)
Round 5							
Start	1/11/2006	-	1/11/2006	-	1/11/2006	1/11/2006	1/11/2006
End	1/23/2006	-	1/23/2006	-	1/23/2006	1/23/2006	1/23/2006
Days	12	-	12	-	12	12	12
Total Rainfall, Inches	3.58 (A)	-	3.58 (A)	-	3.58 (A)	3.58 (A)	3.58 (A)
Reference Volume, L	7.31 (B)	-	7.31 (B)	-	7.31 (B)	7.31 (B)	7.31 (B)
Round 6							
Start	1/23/2006	-	1/23/2006	-	1/23/2006	1/23/2006	1/23/2006
End	2/2/2006	-	2/2/2006	-	2/2/2006	2/2/2006	2/2/2006
Days	10	-	10	-	10	10	10
Total Rainfall, Inches	4.04 (A)	-	4.04 (A)	-	4.04 (A)	4.04 (A)	4.04 (A)
Reference Volume, L	8.25 (B)	-	8.25 (B)	-	8.25 (B)	8.25 (B)	8.25 (B)

Table 1 - Sample Matrix
Lower Duwamish - Passive Deposition Sampling - Phase 2

Station	Beacon Hill	Beacon Hill (Relocated)	Duwamish	Duwamish (Relocated)	Georgetown	King County International Airport - Terminal	South Park Community Center
Station ID	BVW	BVR	CE	CER	DZ	KCIA	SPCC
Location	15th S. & Charlestown		4752 E. Marginal Wy. S.	4401 E. Marginal Wy. S.	6431 Corson Ave. S.	7277 Perimeter Rd.	8319 8th. Ave. S.
Latitude	N47°34'10.9"	N47°34'07.0"	N47°33'30.7"	N47°33'47.8"	N47°32'41.2"	N47°32'12.9"	N47°31'42.4"
Longitude	W122°19'44.4"	W122°18'32.2"	W122°20'19.4"	W122°20'26.2"	W122°19'24.9"	W122°18'14.1"	W122°19'25.3"
Round 7							
Start	2/2/2006	-	2/2/2006	-	2/2/2006	2/2/2006	2/2/2006
End	2/27/2006	-	2/27/2006	-	2/27/2006	2/27/2006	2/27/2006
Days	25	-	25	-	25	25	25
Total Rainfall, Inches	1.79 (A)	-	1.79 (A)	-	1.79 (A)	1.79 (A)	1.79 (A)
Reference Volume, L	3.66 (B)	-	3.66 (B)	-	3.66 (B)	3.66 (B)	3.66 (B)
Round 8 (No Samples)							
Start	2/27/2006	-	2/27/2006	-	2/27/2006	2/27/2006	2/27/2006
End	4/20/2006	-	4/20/2006	-	4/20/2006	4/20/2006	4/20/2006
Days	52	-	52	-	52	52	52
Total Rainfall, Inches	4.75 (A)	-	4.75 (A)	-	4.75 (A)	4.75 (A)	4.75 (A)
Reference Volume, L	9.71 (B)	-	9.71 (B)	-	9.71 (B)	9.71 (B)	9.71 (B)
Round 9							
Start	-	-	-	4/20/2006	4/20/2006	4/20/2006	4/20/2006
End	-	-	-	5/23/2006	5/23/2006	5/23/2006	5/23/2006
Days	-	-	-	33	33	33	33
Total Rainfall, Inches	-	-	-	1.58 (A)	1.58 (A)	1.58 (A)	1.58 (A)
Reference Volume, L	-	-	-	3.23 (B)	3.23 (B)	3.23 (B)	3.23 (B)
Round 10							
Start	-	-	-	5/23/2006	5/23/2006	5/23/2006	5/23/2006
End	-	-	-	6/14/2006	6/14/2006	6/14/2006	6/14/2006
Days	-	-	-	22	22	22	22
Total Rainfall, Inches	-	-	-	2.82 (A)	2.82 (A)	2.82 (A)	2.82 (A)
Reference Volume, L	-	-	-	5.76 (B)	5.76 (B)	5.76 (B)	5.76 (B)
Round 11							
Start	-	-	-	6/14/2006	6/14/2006	6/14/2006	6/14/2006
End	-	-	-	8/1/2006	8/1/2006	8/1/2006	8/1/2006
Days	-	-	-	48	48	48	48
Total Rainfall, Inches	-	-	-	0.18 (A)	0.18 (A)	0.18 (A)	0.18 (A)
Reference Volume, L	-	-	-	0.37 (B)	0.37 (B)	0.37 (B)	0.37 (B)
Round 12							
Start	-	-	-	8/1/2006	8/1/2006	8/1/2006	8/1/2006
End	-	-	-	9/28/2006	9/28/2006	9/28/2006	9/28/2006
Days	-	-	-	58	58	58	58
Total Rainfall, Inches	-	-	-	1.45 (A)	1.45 (A)	1.45 (A)	1.45 (A)
Reference Volume, L	-	-	-	2.96 (B)	2.96 (B)	2.96 (B)	2.96 (B)

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Longitude	W122°18'44.4"	W122°18'32.2"	W122°20'19.4"	W122°20'26.2"	W122°19'24.9"	W122°18'14.1"	W122°19'26.3"
Round 13							
Start	-	9/28/2006	-	9/28/2006	9/28/2006	9/28/2006	9/28/2006
End	-	11/1/2006	-	11/1/2006	11/1/2006	11/1/2006	11/1/2006
Days	-	34	-	34	34	34	34
Total Rainfall, Inches	-	1.55 (A)	-	1.55 (A)	1.55 (A)	1.55 (A)	1.55 (A)
Reference Volume, L	-	3.17 (B)	-	3.17 (B)	3.17 (B)	3.17 (B)	3.17 (B)
Round 14 (No Samples)							
Start	-	11/1/2006	-	11/1/2006	11/1/2006	11/1/2006	11/1/2006
End	-	11/21/2006	-	11/21/2006	11/21/2006	11/21/2006	11/21/2006
Days	-	20	-	20	20	20	20
Total Rainfall, Inches	-	13.11 (A)	-	13.11 (A)	13.11 (A)	13.11 (A)	13.11 (A)
Reference Volume, L	-	26.79 (B)	-	26.79 (B)	26.79 (B)	26.79 (B)	26.79 (B)
Round 15							
Start	-	11/21/2006	-	11/21/2006	11/21/2006	11/21/2006	11/21/2006
End	-	12/5/2006	-	12/5/2006	12/5/2006	12/5/2006	12/5/2006
Days	-	14	-	14	14	14	14
Total Rainfall, Inches	-	3.02 (A)	-	3.02 (A)	3.02 (A)	3.02 (A)	3.02 (A)
Reference Volume, L	-	6.17 (B)	-	6.17 (B)	6.17 (B)	6.17 (B)	6.17 (B)

Notes:

(A) - Recorded at National Weather Service - SeaTac International Airport Station (Source: www.beautifulseattle.com). Value includes total 24-hr rainfall on day of sampler placement and total 24-hr rainfall on day of sampler retrieval.

(B) - Reference Volume Based on a Passive Deposition Sampler Collection Area of 0.0805 m² (0.866 ft²) and Total Rainfall Recorded at National Weather Service - SeaTac International Airport Station (Source: www.beautifulseattle.com)

Table 2
LDW - Passive Deposition Sampling - Phase 2
Data Sorted According to Sampling Station

			Phthalates						Carcinogenic PAH (cPAH)								Other PAH		PCB Mixtures (Aroclors)							
			Benzyl Butyl Phthalate	Bis(2-Ethylhexyl)phthalate	Diethyl Phthalate	Dimethyl Phthalate	Di-n-Butyl Phthalate	Di-n-Octyl Phthalate	Benz[a]anthracene	Benz[e]pyrene	Benz[b]fluoranthene	Benz[k]fluoranthene	Chrysene	Dibenz[a,h]anthracene	Indeno[1,2,3-cd]pyrene	Benz[a]fluoranthene	Pyrene	Aroclor 016	Aroclor 121	Aroclor 122	Aroclor 124	Aroclor 124	Aroclor 124	Aroclor 124		
Blank-Corrected Air Deposition Flux (µg/m²/day) (A)																										
Station	Station ID	Round	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day	µg/m²/day		
Beacon Hill	BW	1	0.090	1.340	0.135	0.035	ND	0.144	0.030	ND	0.072	0.054	0.090	0.012	0.059	0.070	0.112	-	-	-	-	-	-	-		
Beacon Hill	BW	2	0.404	1.632	0.092	0.025	0.143	0.096	0.023	0.026	0.049	0.040	0.075	ND	0.025	0.040	0.125	-	-	-	-	-	-	-		
Beacon Hill	BW	3	0.256	1.007	0.150	0.034	0.015	0.165	0.021	0.021	0.049	0.040	0.065	ND	0.027	0.045	0.091	-	-	-	-	-	-	-		
Beacon Hill	BW	5	0.586	0.955	0.304	0.030	ND	0.099	ND	ND	0.033	ND	0.038	ND	ND	ND	0.109	-	-	-	-	-	-	-		
Beacon Hill	BW	6	0.688	1.573	0.093	0.035	0.030	ND	ND	ND	0.060	ND	0.074	ND	ND	0.058	0.167	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062		
Beacon Hill	BW	7	0.193	1.145	0.093	0.022	0.044	0.137	0.022	0.021	0.044	0.032	0.051	ND	0.025	0.039	0.075	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025		
Beacon Hill	BW	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Beacon Hill	BW	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Beacon Hill (Relocated)	BWR	13	0.312	2.030	ND	ND	ND	ND	ND	ND	ND	0.074	ND	ND	ND	ND	0.087	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019		
Beacon Hill (Relocated)	BWR	15	0.205	1.152	0.248	0.031	0.138	ND	ND	ND	0.036	ND	0.037	ND	ND	0.035	0.066	<0.044	<0.044	<0.044	<0.044	<0.044	<0.044	<0.044		
Duwamish	CE	1	1.069	8.176	0.172	0.048	0.171	0.667	0.043	0.144	0.206	0.204	0.111	0.060	0.151	0.235	0.153	-	-	-	-	-	-	-		
Duwamish	CE	2	0.916	6.373	0.102	0.050	0.405	0.249	0.243	0.217	0.156	0.124	0.403	0.030	0.069	0.126	0.675	-	-	-	-	-	-	-		
Duwamish	CE	3	0.719	5.135	0.126	0.153	0.058	0.760	0.223	0.265	0.317	0.317	0.464	0.079	0.208	0.323	0.831	-	-	-	-	-	-	-		
Duwamish	CE	5	0.419	7.129	0.385	0.120	ND	0.467	0.054	0.052	0.080	0.065	0.127	ND	0.048	0.092	0.291	-	-	-	-	-	-	-		
Duwamish	CE	6	1.005	12.240	0.145	0.103	0.381	ND	0.143	0.148	0.250	0.188	0.327	0.043	0.152	0.273	0.671	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063		
Duwamish	CE	7	0.678	6.679	0.098	0.076	0.079	0.329	0.195	0.233	0.267	0.270	0.373	0.043	0.164	0.231	0.759	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024		
Duwamish (Relocated) (B)	CER	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019		
Duwamish (Relocated)	CER	10	0.338	1.628	ND	ND	0.034	ND	ND	ND	ND	0.120	ND	ND	ND	ND	0.133	-	-	-	-	-	-	-		
Duwamish (Relocated)	CER	11	0.675	1.513	0.008	ND	0.111	ND	0.003	ND	0.052	ND	0.113	ND	ND	0.106	0.126	-	-	-	-	-	-	-		
Duwamish (Relocated)	CER	12	0.388	1.604	0.041	ND	0.201	ND	0.005	0.013	0.068	0.076	0.112	ND	0.005	0.111	0.148	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	0.014		
Duwamish (Relocated)	CER	13	0.334	1.939	0.060	ND	0.022	ND	ND	ND	ND	0.151	ND	ND	0.157	0.191	0.191	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	0.019		
Duwamish (Relocated)	CER	15	0.287	1.439	0.219	0.029	0.512	ND	0.023	ND	0.054	0.042	0.076	ND	0.054	0.051	0.212	<0.044	<0.044	<0.044	<0.044	<0.044	<0.044	<0.044		
Georgetown	DZ	1	0.883	2.550	0.214	0.063	ND	1.402	0.059	0.030	0.102	0.063	0.136	ND	0.052	0.062	0.194	-	-	-	-	-	-	-		
Georgetown	DZ	2	0.677	2.989	0.200	0.059	0.283	0.380	0.064	0.065	0.166	0.104	0.186	0.027	0.086	0.135	0.274	-	-	-	-	-	-	-		
Georgetown	DZ	3	0.293	2.255	0.093	0.116	ND	0.541	0.074	0.094	0.161	0.157	0.212	0.033	0.110	0.161	0.338	-	-	-	-	-	-	-		
Georgetown	DZ	5	0.652	1.187	0.426	0.085	ND	0.318	0.021	ND	0.035	0.032	0.050	ND	ND	0.032	0.129	-	-	-	-	-	-	-		
Georgetown	DZ	6	0.764	2.617	0.218	0.074	0.224	0.737	0.069	0.134	0.179	0.152	0.172	0.170	0.232	0.302	0.313	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062		
Georgetown	DZ	7	0.274	2.512	0.024	0.051	0.004	0.706	0.086	0.089	0.164	0.145	0.207	0.022	0.103	0.154	0.327	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025		
Georgetown	DZ	9	0.236	2.071	ND	ND	2.415	ND	ND	ND	0.172	0.147	0.205	0.000	0.112	0.181	0.262	<0.019	<0.019	<0.019	<0.019	<0.019	0.030	0.034		
Georgetown	DZ	10	0.215	2.672	ND	ND	0.033	1.262	ND	ND	ND	ND	0.117	ND	ND	ND	0.161	-	-	-	-	-	-	-		
Georgetown	DZ	11	0.245	1.399	0.007	ND	0.082	2.874	0.005	0.008	0.010	0.009	0.051	ND	0.006	0.010	0.116	-	-	-	-	-	-	-		
Georgetown (C)	DZ	12	0.280	1.581	0.025	ND	0.111	2.326	0.009	0.021	0.121	0.103	0.148	ND	0.012	0.122	0.161	<0.011	<0.011	<0.011	<0.011	<0.011	0.036	0.024		
Georgetown	DZ	13	0.266	3.654	0.070	ND	0.048	0.868	0.075	ND	0.152	0.112	0.187	ND	0.122	0.216	0.238	<0.018	<0.018	<0.018	<0.018	<0.018	0.021	0.019		
Georgetown	DZ	15	0.290	0.402	0.268	0.058	0.256	ND	0.022	ND	0.049	0.036	0.052	ND	0.033	0.047	0.140	<0.044	<0.044	<0.044	<0.044	<0.044	<0.044	<0.044		
King County Intl. Airport	KCIA	1	2.913	1.149	0.217	0.059	0.057	0.187	0.704	0.963	1.532	1.309	1.540	0.387	0.889	0.996	1.910	-	-	-	-	-	-	-		
King County Intl. Airport	KCIA	2	0.535	2.275	0.134	0.036	0.250	0.144	1.090	1.483	2.144	2.026	2.245	0.460	1.390	1.596	2.831	-	-	-	-	-	-	-		
King County Intl. Airport	KCIA	3	0.336	2.043	0.203	0.058	0.100	0.112	1.235	1.815	2.692	2.261	2.768	0.546	1.661	1.830	3.522	-	-	-	-	-	-	-		
King County Intl. Airport	KCIA	5	2.799	0.669	0.447	0.053	ND	0.076	0.185	0.234	0.375	0.310	0.347	0.072	0.228	0.259	0.574	-	-	-	-	-	-	-		
King County Intl. Airport	KCIA	6	1.330	1.694	0.154	0.100	0.086	0.125	1.311	1.697	2.644	2.358	2.622	0.507	1.686	1.851	3.416	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062		
King County Intl. Airport	KCIA	7	0.688	1.941	0.121	0.032	0.053	ND	0.870	1.211	1.815	1.548	1.847	0.308	1.102	1.236	2.797	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025		
King County Intl. Airport	KCIA	8	0.246	1.330	0.026	ND	ND	ND	1.046	1.482	2.473	1.556	2.158	0.418	1.361	1.555	3.202	<0.019	<0.019	<0.019	<0.019	<0.019	0.045	<0.019		
King County Intl. Airport	KCIA	10	0.938	1.587	0.315	ND	0.462	ND	0.984	1.443	2.115	1.762	2.152	0.430	1.317	1.558	2.893	-	-	-	-	-	-	-		
King County Intl. Airport	KCIA	11	0.238	1.162	ND	ND	0.033	ND	0.967	1.378	2.130	1.696	1.974	0.417	1.307	1.475	2.605	-	-	-	-	-	-	-		
King County Intl. Airport	KCIA	12	0.431	1.437	0.052	ND	0.345	ND	0.872	1.395	2.032	1.632	1.945	0.370	1.201	1.365	2.542	<0.011	<0.011	<0.011	<0.011	<0.011	0.024	0.019		
King County Intl. Airport	KCIA	13	0.216	1.829	0.046	ND	0.042	ND	1.215	1.719	2.859	1.960	2.670	0.579	2.149	2.494	3.513	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018		
King County Intl. Airport	KCIA	15	0.261	0.268	0.404	0.044	0.527	ND	0.604	0.827	1.187	0.820	1.127	0.275	0.834	0.927	1.834	<0.044	<0.044	<0.044	<0.044	<0.044	<0.044	<0.044		

KCSltp4 56424

Table 2
LDW - Passive Deposition Sampling - Phase 2
Data Sorted According to Sampling Station

Phthalates							Carcinogenic PAH (cPAH)								Other PAH		PCB Mixtures (Aroclors)							
Bis(2-Ethylhexyl)Phthalate	Bis(2-Ethylhexyl)Phthalate	Diethyl Phthalate	Dimethyl Phthalate	Di-N-Butyl Phthalate	Di-N-Octyl Phthalate		Benzofluoranthene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Chrysene	Dibenz[a,h]anthracene	Indeno[1,2,3-cd]pyrene	Benzo[ghi]perylene	Pyrene		Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	
Station	Station ID	Round	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day		ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	ug/m ² /day	
South Park Com. Cntr.	SPCC	1	7.007	1.682	0.184	0.060	0.082	0.158	0.044	0.029	0.097	0.074	0.116	ND	0.050	0.065	0.163	-	-	-	-	-	-	-
South Park Com. Cntr.	SPCC	2	2.078	1.704	0.138	0.052	0.239	0.149	0.063	0.055	0.125	0.092	0.145	0.022	0.069	0.101	0.238	-	-	-	-	-	-	-
South Park Com. Cntr.	SPCC	3	4.437	6.370	0.202	0.103	0.138	0.215	0.084	0.101	0.145	0.146	0.194	0.030	0.091	0.120	0.337	-	-	-	-	-	-	-
South Park Com. Cntr.	SPCC	5	2.447	4.730	0.447	0.066	ND	0.140	ND	ND	0.035	ND	0.047	ND	ND	0.032	0.121	-	-	-	-	-	-	-
South Park Com. Cntr.	SPCC	6	1.223	1.146	0.146	0.038	0.087	0.191	0.044	ND	0.103	0.068	0.110	ND	ND	ND	0.210	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062
South Park Com. Cntr.	SPCC	7	1.778	2.711	0.131	0.042	0.093	0.160	0.061	0.066	0.100	0.099	0.138	0.020	0.056	0.082	0.246	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024
South Park Com. Cntr.	SPCC	9	1.056	4.429	0.037	0.104	0.014	ND	0.079	0.126	0.149	0.126	0.212	0.038	0.047	0.185	0.302	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018
South Park Com. Cntr.	SPCC	10	0.404	2.016	ND	ND	0.026	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-
South Park Com. Cntr.	SPCC	11	0.324	2.457	0.008	ND	0.041	ND	ND	ND	0.086	ND	0.092	ND	ND	0.087	0.132	-	-	-	-	-	-	-
South Park C. Cntr.(Dup.)	SPCC-Dup	11	0.340	2.525	ND	ND	0.037	ND	ND	ND	ND	ND	0.083	ND	ND	ND	0.099	-	-	-	-	-	-	-
South Park Com. Cntr.	SPCC	12	0.496	3.563	0.044	ND	0.243	ND	0.078	0.099	0.127	0.102	0.148	ND	0.072	0.102	0.200	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011
South Park C. Cntr.(Dup.)	SPCC-Dup	12	0.261	1.224	0.033	ND	0.135	ND	0.041	0.056	0.067	0.059	0.079	ND	0.042	0.059	0.121	<0.011	<0.011	<0.011	<0.011	<0.011	0.011	<0.011
South Park Com. Cntr.	SPCC	13	1.194	2.780	0.070	ND	0.148	ND	0.006	ND	0.115	ND	0.144	ND	ND	0.135	0.200	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019
South Park Com. Cntr.	SPCC	15	0.385	0.261	0.252	0.047	0.476	ND	0.024	ND	0.050	0.042	0.058	ND	0.034	0.039	0.130	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045

Round 1 to Round 15 Summary - Detected Values for PAH/Phthalates Only

Reason: H16 & Reason: H17 (Relocated)

Maximum	0.980	2.030	0.304	0.035	0.143	0.165	0.030	0.026	0.072	0.054	0.090	0.012	0.059	0.070	0.167
Minimum	0.193	0.955	0.092	0.022	0.015	0.098	0.021	0.021	0.033	0.032	0.037	0.012	0.025	0.035	0.066
Median	0.358	1.246	0.135	0.031	0.044	0.137	0.023	0.021	0.049	0.040	0.070	0.012	0.026	0.043	0.100

Duvernish & Duvernish (Relocated)

Maximum	1.069	12.240	0.385	0.153	0.512	0.760	0.243	0.265	0.317	0.317	0.464	0.079	0.208	0.323	0.831
Minimum	0.287	1.438	0.008	0.029	0.022	0.249	0.003	0.013	0.054	0.042	0.076	0.030	0.005	0.051	0.126
Median	0.675	5.135	0.114	0.076	0.141	0.487	0.054	0.148	0.159	0.158	0.127	0.043	0.110	0.142	0.212

Georgetown

Maximum	0.883	3.654	0.426	0.116	0.283	2.874	0.086	0.134	0.179	0.157	0.212	0.170	0.232	0.302	0.938
Minimum	0.215	0.402	0.007	0.051	0.004	0.318	0.005	0.008	0.010	0.009	0.050	0.000	0.006	0.010	0.116
Median	0.285	2.383	0.146	0.063	0.096	0.868	0.061	0.065	0.152	0.104	0.160	0.027	0.095	0.135	0.216

Kino County International Airport

Maximum	2.813	2.275	0.447	0.100	0.527	0.187	1.311	1.815	2.859	2.358	2.768	0.579	2.149	2.494	3.522
Minimum	0.216	0.268	0.026	0.032	0.033	0.076	0.185	0.234	0.375	0.310	0.347	0.072	0.228	0.259	0.574
Median	0.483	1.512	0.154	0.053	0.093	0.126	0.876	1.419	2.123	1.864	2.063	0.418	1.312	1.517	2.814

South Park Community Center

Maximum	7.007	6.370	0.447	0.104	0.476	0.215	0.084	0.126	0.149	0.146	0.212	0.039	0.091	0.185	0.337
Minimum	0.261	0.261	0.008	0.038	0.014	0.140	0.005	0.029	0.035	0.042	0.047	0.020	0.034	0.032	0.099
Median	1.125	2.491	0.134	0.056	0.093	0.159	0.053	0.068	0.101	0.092	0.116	0.025	0.053	0.087	0.200

Notes:

Detected values only for bis(2-Ethylhexyl)phthalate and cPAH.

(A) - bis(2-Ethylhexyl)phthalate blank-correction conducted by subtracting two-times (2x) aqueous method blank mass from aqueous sample mass combined with subtracting two-times (2x) wipe method blank mass from wipe sample mass. If blank subtraction results in a negative value, a value of zero (0) is used instead. No blank correction required for cPAH or PCBs.

(B) - Not Reported. Results biased-low. Sample spilled during sample preparation. Estimated sample loss - 65 to 80%.

(C) - Problems encountered during sample preparation.

ND - Not detected in original sample.

BD - PCB detected value.